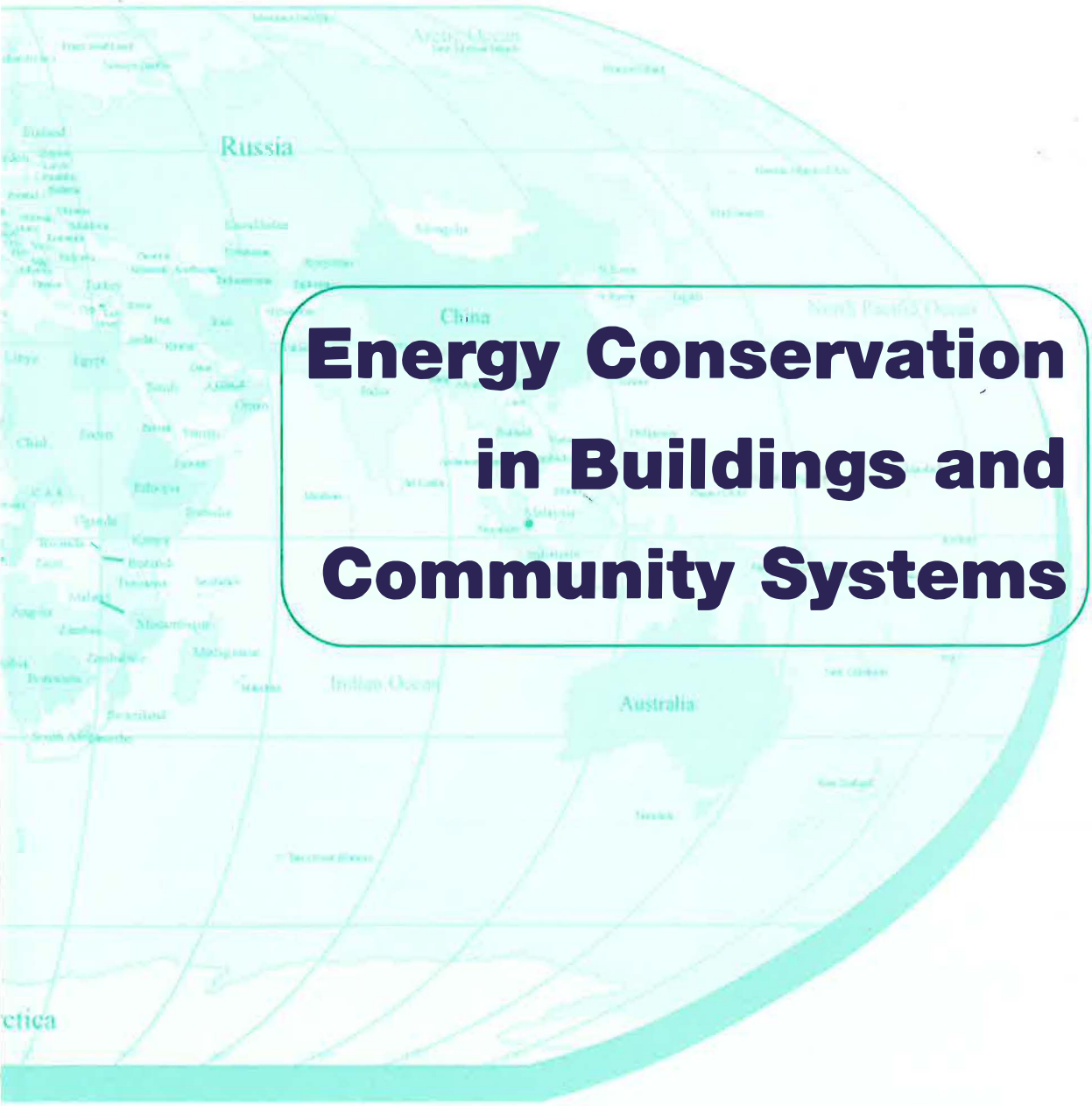
INTERNATIONAL ENER

1998 -



Energy Conservation in Buildings and Community Systems

ANNUAL REPORT

ECBCS Annual Report 1998-1999

Contents

1. Report from the Chairman

Richard Karney
(Director of the Office of Building Systems within the US Dept of Energy)

The buildings related Implementing Agreements (IA's) within the International Energy Agency may well be at a crossroads. New topics of research are emerging, both from the needs of individual countries and from the desires of the Committee of Energy Research and Technology (CERT). Many of these subjects deal with the larger global issues such as the environment, climate change, sustainability, and overall technology deployment. At the same time that these pressing needs are proposed, fiscal austerity will remain or increase in its prominence for all members of the IEA. Synergy contributes to the implementing agreements meeting their goals.

Speaking of products, the quantity and quality of our information services is growing as communication technologies are continuously improved. The beginning of an ExCo information centre has already started with innovative products and services to the IEA and the world in the planning pipeline. The key to the final technology transfer of our research results lies in our ability to get the information to the target audience of experts, practitioners and end users. Improving our transfer and deployment capability gets the technology used. This has been a primary focus of the past year.

I look forward to the forthcoming period for the ECBCS research program. With new and exciting projects on the horizon, opportunities for collaborative research with other Implementing Agreements and a solid foundation in place, our program will continue to grow to meet the needs of the IEA community and the world. I am pleased to outline these developments in this annual report.

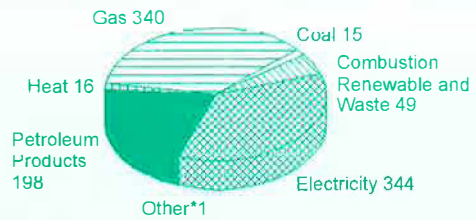
2. About the International Energy Agency

The International Energy Agency (IEA) was established as an autonomous body within the Organisation for Economic Co-operation and Development (OECD) in 1974. Its purpose is to strengthen co-operation in the vital area of energy policy. As one element of this programme, member countries take part in various energy research, development and demonstration activities that are instituted through a series of Implementing Agreements and a solid foundation in place, our program will continue to grow to meet the needs of the IEA community and the world. I am pleased to outline these developments in this report.

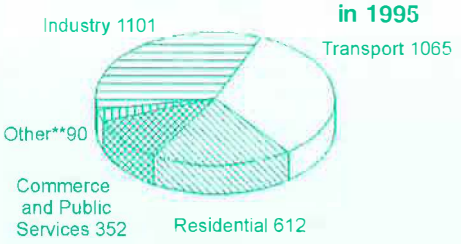
3. About ECBCS

Approximately one third of primary energy is consumed in non-industrial buildings such as dwellings, offices, hospitals, and schools where it is utilized for the heating and cooling, lighting and operation of appliances. In terms of the total energy end use, this consumption is comparable to that used in the entire transport sector. Hence the building sector represents a major contributor to fossil fuel use and carbon dioxide production. Following uncertainties in energy supply and concern over the risk of global warming, many countries have now introduced target values for reduced energy use in buildings. Overall, these are aimed at reducing energy consumption by between 15-30%. To achieve such a target, international co-operation, in which research activities and knowledge can be shared, is seen as an essential activity.

Energy consumption in the residential commercial and services sectors in 1995



Total Final Consumption in 1995



Source: Energy Statistics of OECD countries; IEA.

** other includes geothermal, solar, wind, etc*

*** other includes agriculture. Commerce and public services, and non specified*

Energy used in the building sector of the OECD countries. 964 Million tonnes of oil equivalent (Mtoe) in residential, commercial and services sector; 3221 Mtoe Final consumption.

In recognition of the significance of energy use in buildings, the International Energy Agency has established an Implementing Agreement on Energy Conservation in Buildings and Community Systems (ECBCS). The function of ECBCS is to undertake research and provide an international focus for building energy efficiency. Tasks are undertaken through a series of Aannexes that are directed at energy saving technologies and activities that support technology application in practice. Results are also used in the formulation of international and national energy conservation policies and standards.

ECBCS undertakes a diverse range of activities both through its individual Annexes and through centrally organised development and information exchange. ECBCS countries are free to choose which Annexes to take part in. Activities usually take the form of a 'Task Shared' Annex in which each country commits an agreed set of products. Occasionally, an Annex may be either wholly or partially jointly funded. More informal activities take place through Working Groups.

Member Countries of the ECBCS

There are currently 21 Member Countries of the ECBCS; these are: Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Poland, Portugal, Sweden, Switzerland, Turkey, the United Kingdom and the United States of America. The Commission for the European Communities (CEC) also participates.

Joining ECBCS

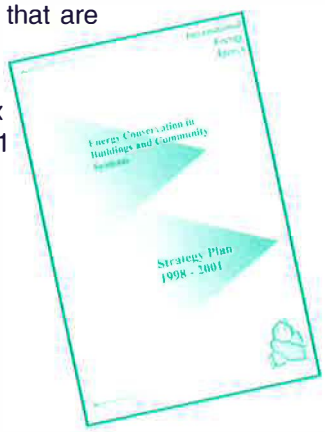
Countries (through their respective governments) are welcome to join the Implementing Agreement of ECBCS. Full details are available from the ExCo Services Support Unit (ESSU see Sections 7 & 8).

4. Developing the ECBCS Research Programme

ECBCS has introduced several mechanisms by which its research programme is developed. In recent times, these have substantially strengthened the work of the Implementing Agreement by focusing resources at specific needs. The elements of this development programme include:

4.1 Strategic Planning

Prioritising of activities is developed through the Strategic Plan, the most recent of which was published in November 1998. In formulating the Strategic Plan, each country first outlines its own priorities. Common needs are then identified and those priorities that are identified as being most likely to benefit from international activity are incorporated in the plan. Ideas for the Strategic Plan also come from existing Annex participants and from the results of current Annex activities. New priorities for the ECBCS's operating period 1998 - 2001 include:



- Sustainability;
- Energy Retrofit;
- Advanced Controls (Energy) Management System;
- Dissemination.

4.2 Future Buildings Forum

Longer term research planning is developed through the Future Buildings Forum - 2025. This was established to identify long term energy, environmental and other issues that relate to buildings and their design and operation. Initiated by ECBCS, the Future Buildings Forum is now an instrument of all the building related IA's of the IEA. It operates through a series of specialist workshops at which ideas are formulated and at which new research ideas are proposed.

4.3 Interaction with Other Activities

A further way in which ideas are progressed and duplication is avoided is through co-operation with other building related activities. These links have been considerably strengthened and include:

Interaction with other building related Implementing Agreements and Technical Centres of the IEA, especially:

- Solar Heating and Cooling;
- Heat Pump Technologies;
- District Heating and Cooling;
- Energy Storage;
- Photovoltaic Power Systems;
- Demand Side Management;
- The Centre for the Demonstration and Dissemination of Energy Technology (CADDET);
- GREENTIE;
- Energy Technology Exchange (ETDE).

Interaction with Solar Heating and Cooling takes place with regular joint meetings.

Collaboration with other International Organisations.

Other international organisations with which ECBCS has established links include:

The International Council for Building Research Studies and Documentation (CIB): This organisation is sponsored by both individuals and various groups or companies. CIB is responsible for developing building related committees, work groups and conferences. A memorandum of understanding has been established with CIB covering the dissemination of results and avoidance of duplication of effort.

The EU Framework Programme: This framework programme sponsors research, primarily within the European Union countries. Participation by the Commission for Europe in the ECBCS has provided much opportunity for shared results and the cross-pollination of ideas.

International Standards Organisation (ISO): The ISO sets standards that can be adopted by individual countries or communities. Several ECBCS participants take part in ISO activities, thus ensuring the transfer of results and information for the development of Standards.

5. The ECBCS Research Programme

The primary rationale for ECBCS is its research programme. This is mainly undertaken through a series of Annexes. Typically, each Annex has a life span of 3-4 years, although extensions are possible if a continuing need for the activity is identified. Clear goals are set for each activity so that well defined products are generated. During the past year, three new Annexes have been initiated, three have been completed and six are ongoing. The current status of these activities is summarised:

5.1 New ECBCS Research Annexes

Newly established annexes include:

Annex 35 Control Strategies for Hybrid Ventilation in both New and Retrofitted Office Buildings (HybVent).

HybVent is concerned with the efficient ventilation of non-residential buildings by means of ventilation systems that combine the best features of both natural and mechanical systems. The scope of the Annex is to obtain improved knowledge concerning the use of hybrid ventilation technologies especially in relation to:

- The development of control strategies;
- The development of methods to predict hybrid ventilation performance;
- The implementation and demonstration of hybrid ventilation in real buildings.

Proposed products include:

- State-of-the-art review of hybrid ventilation technologies, control strategies and algorithms;
- Assessment of potential for hybrid ventilation retrofit;
- A handbook on the principles of hybrid ventilation, including solutions for energy and cost efficient hybrid ventilation;
- Recommendations on control strategies;
- Analysis tools for performance prediction of hybrid ventilation;
- Decision tools for hybrid ventilation applications;
- A report on measurement techniques for diagnostics and commissioning of hybrid ventilation systems;
- Demonstration and case study analysis.

Operating Period: *1998 - 2002*
Operating Agent: *Per Heiselberg, Aalborg University, Denmark*
Participating Countries: *Australia, Canada, Denmark, France, Greece, Italy and Japan*

Annex 36 Retrofitting in Educational Buildings - An Energy Concept Adviser for Technical Retrofit Measures

Educational buildings such as kindergartens, schools, training centres and universities display many similar design, operation and maintenance features throughout IEA countries. For example, such buildings frequently have similar structures, often need to be retrofitted and have high energy consumption. Because of the level of similarity that exists within this building sector, experiences gained in developing different approaches to combat similar problems, especially during retrofitting, can easily be transferred to other countries.

Existing studies suggest that decision-makers often have difficulty in evaluating the potential of energy saving measures. There are few "rules of thumb" to enable a quick and easy estimation of the levels of required investment. To overcome this, a 'PC' based 'energy concept adviser' for economical retrofit measures is proposed. This will incorporate:

- Simple prediction tools for retrofit concepts which allow the decision-maker to evaluate integrated construction, installation and lighting measures;
- Costs, payback and energy and environmental performance analysis;
- Simple methods for testing the efficiency of the applied measures.

This Annex is also aimed at promoting energy and cost efficient retrofit measures and providing decision-makers with the confidence to evaluate and accept these concepts.

EROS School Stuttgart, Germany *A case study building which was reviewed at the planning stage of Annex 36. The original 1930's facade is retained with insulation applied to the internal walls. Special care was necessary to avoid thermal bridging.*

Operating Period: *1998 - 2002*
Operating Agent: *Hans Erhorn, Fraunhofer Institute, Germany*
Participating Countries: *Denmark, Finland, Germany, Portugal, Sweden, United Kingdom and the United States of America*

Annex 37 Low Exergy Systems for Heating and Cooling of Buildings

Low 'exergy' is concerned with using 'low quality' energy sources. For space heating, this means using 'low' temperature heat sources while, for cooling, it means using 'high' temperature 'waste' sources. As a consequence, the differential between the energy source temperature and the desired space conditioning temperature is very small. The development of this type of approach is a pre-requisite for the wide spread use of 'alternative' energy sources. Above all, the strategy must fulfil the thermal requirements of building occupants.

The overall objectives of the Annex are:

- To investigate the potential for replacing 'high value' energy sources (e.g. fossil fuels and electricity) by 'low value' sources (e.g. ground sources, 'waste' heat etc.) and to assess its impact on global issues such as the reduction of greenhouse gas emissions;
- To assess existing technologies and components for low exergy heating and cooling in buildings and to enhance the development of new technologies;
- To assess and provide the necessary tools for the evaluation of low exergy systems;
- To develop a strategic means for introducing low exergy solutions in buildings by demonstration, design tools and guidelines.

Project period: *1999-2002*
Operating Agent: *Markku Virtanen, VTT, Finland,*
Participating Countries: *To be confirmed.*

5.2 On-going Activities

In addition to new research work, there is a comprehensive programme of on going activities; these include:

Annex 5: The Air Infiltration and Ventilation Centre

In 1999, the AIVC marks its twentieth year of operation. During this time, the Centre has maintained a technical information service to policy makers, practitioners and researchers. Currently funded by twelve countries, it has developed an extensive range of innovative dissemination products including:

- **AIRBASE the AIVC's bibliographic database:** This contains reference to over 12,000 library items covering ventilation research and development;
- **International Library Service:** The AIVC provides an international library service and responds to requests for over 6000 items of literature each year;
- **Quarterly Newsletter and Library Bulletin:** A regular newsletter and library bulletin is sent to over 2500 organisations.
- **Technical Guides, Reports and CD's:** The Centre has produced a series of comprehensive guides. The most recent publication covers applicable numerical models for ventilation analysis. This will shortly be complemented by a 'CD' numerical data guide;
- **Bibliographies:** A wide range of topical bibliographies and literature lists are produced;

- AIVC Web-Site and Bookstore: Considerable use is made of the Internet to disseminate information and to provide a focus for the AIVC. It is regularly accessed by organisations in over 60 countries. The web-site also provides a focus for the AIVC's successful bookstore and attracts many purchasers through on-line ordering;
- Annual Conference: The Centre organises an annual conference aimed at important topic areas.

As the AIVC approaches the new Millennium, it has begun to develop a strategy aimed at securing its longer-term future. This has been undertaken by reducing its dependency on jointly funded country contributions. The approach is wider dissemination of products to industry, and partnership with industry on promoting ventilation technology.

Current Project Period: *1998 - 2001 (Annex established in 1989)*
Operating Agent: *Martin Liddament, Oscar Faber Applied Research, UK*
Participating Countries: *Belgium, Denmark, Finland, France, Germany, Greece, Netherlands, New Zealand, Norway, Sweden, United Kingdom and the United States of America*

Annex 27 Evaluation and Demonstration of Domestic Ventilation Systems

Dwellings represent about 25 - 30% of energy use in the OECD countries. Of this, ventilation losses can represent up to half of the total energy loss. Since ventilation is essential for health and well-being, any energy reduction must be based on the efficient use of ventilation. Annex 27 has focused on securing such ventilation technology for the home.

The objective of this Annex is to:

- Develop methods for evaluating domestic ventilation systems;
- Validate the methods with data obtained from measurements;
- Demonstrate and evaluate domestic ventilation systems for different climates, building types, and use of the dwelling

These methods and systems are intended for existing and future domestic buildings that require heating. Subtasks included:

- State of the art with the purpose to give an overview of frequently used system solutions;
- Development and valuation of evaluation methods with the purpose to define parameters select and develop methods for evaluation;
- Evaluation, demonstration, and application of current and innovative ventilation systems with the purpose of evaluating methods for a set of variables and demonstrate different ventilation systems.

This activity has been completed with a handbook of evaluation tools and examples. A further extension to this task is expected to produce a CD-ROM version of these tools using Visual Basic.

Project Period: *1993 - 1998*
Operating Agent: *Lars-Göran Månsson, LGM Consult, AB Sweden*
Participating Countries: *Canada, France, Italy, Japan, Netherlands, Sweden, UK, and the United States of America.*

Annex 29 Daylight in Buildings (in conjunction with Solar Heating and Cooling Programme)

This activity has been involved with advancing 'daylighting' technologies and promoting daylight conscious buildings. It is an activity that has been undertaken jointly with solar heating and cooling. The products are aimed at both new and existing buildings with a high aggregate electricity saving potential such as offices, schools, commercial and institutional buildings. Systems were evaluated by laboratory analysis, computer simulations and case studies.

The main deliverables include:

- A system specific design guide on daylighting systems, and control systems providing recommendations on systems, integration and performance data on energy savings potential;
- A set of daylighting design tools that markedly improve the designer's ability to predict the performance of daylighting systems and control strategies and to evaluate the impact of daylight integration on the overall design concept;
- A case studies report documenting measured data on daylighting performance, energy consumption and user appraisal of the environmental conditions.

Project Period: *1995 - 1999*
Operating Agent: *Kjeld Johnsen, Danish Building Research Institute, Denmark*
Participating Countries: *Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Netherlands, New Zealand, Norway, Switzerland, Sweden, United Kingdom and the United States of America*

Annex 30: Bringing Simulation to Application

This Annex is focused on producing a compilation of calculation and numerical models used for building analysis. Activities include:

- Documenting calculation models;
- Identifying models appropriate for each step of the design process;
- Providing improved communication between model developers and users;
- Developing means of data exchange.

The results of this task are currently being compiled into a simulation handbook. A CD-ROM is also being produced containing simulation models and data.

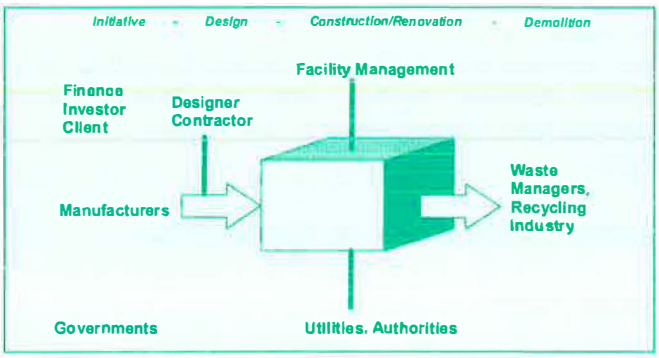
Project Period: *1995 - 1999*
Operating Agent: *Prof. Jean Lebrun, Universite de Liege, Belgium*
Participating Countries: *Belgium, Finland, Germany, Poland and the United Kingdom*

Annex 31: Energy Related Environmental Impacts of Buildings

The aim of this study is to understand the total energy and environmental impact of buildings. This is based on such factors as the life cycle of the building itself combined with energy and material throughput during building use. The results are being compiled into a comprehensive handbook covering:

- Theory;
- Analytical Evaluation Tools;
- Applications;
- Benchmarks;
- Databases;
- Case Studies.

An important part of the study has been the application of tools for such analysis and the comparison of the performance of these tools. This activity has, so far, highlighted a gap between the performance of present tools and future needs. The target audience for this work includes professionals, researchers and teachers.



Components of the Building Life-Cycle Phases

Project Period: *1997 - 2000*
Operating Agent: *Peter Russell, Canada Mortgage and Housing Corporation, Canada*
Participating Countries: *Australia, Canada, Denmark, Finland, France, Germany, Japan, Netherlands, Norway, Sweden, United Kingdom and the United States of America*

Annex 32: Integral Building Envelope Performance Assessment

A good envelope design should be the result of a systematic approach, incorporating checking all relevant elements. A new approach incudes considering all aesthetic and physical properties to be fulfilled by that envelope, integrated with the function of the building as a whole. The objective of this Annex is to develop the methodology and the performances which will support the integral design and evaluation process for building envelopes with the aim of achieving significant energy, environmental and comfort design. Although the envelope, in itself, is a crucial element for the overall performance of the building, the interaction with other building components and the climatic control systems are of equal importance. Therefore, the emphasis of the Annex is on the overall performance of the building seen from the perspective of the envelope. While the focus is on energy efficiency, high quality is aimed at when it comes to aspects like durability, comfort, acoustics and moisture etc.

The Annex is divided into two subtasks:

Subtask A: Assessment Methodology: The objective of this subtask is to develop a comprehensive assessment methodology based on performance criteria leading to rational strategies for the optimisation of building envelopes with respect to their energetic and environmental qualities.

Subtask B: Evaluation Methodology and Design Tools: The objective of this subtask is to test, further develop and evaluate integral design tools, by application on test cases.

Operating Period: *1996-1999.*
Operating Agent: *Belgium, Professor Hugo Hens, KU-Leuven,*
Participants Countries: *Belgium, Canada, Denmark, Finland, Netherlands, Sweden, and Switzerland.*

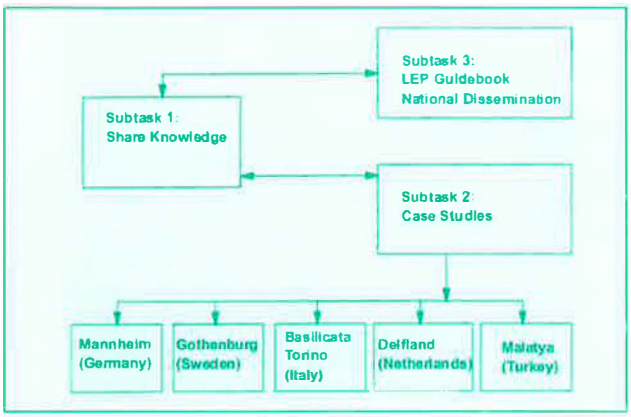
Annex 33: Advanced Local Energy Planning

Energy saving potential will only be maximised when a strategy encompasses an entire community. The purpose of this Annex, therefore, is to apply modern statistical and analytical tools that have been developed for scientific system analysis to the area of local or urban energy and environmental planning. The approach has been one of direct application to specific towns and cities within participating countries.

Once such a model is established for a specific case study, different scenarios can be simulated and the outcomes predicted. This enables the planner to prepare solutions for optimum strategic planning of the municipal energy system.

The Annex is subdivided into 3 Subtasks (Figure below) covering:

- Transfer and Sharing of Knowledge;
- Case Studies;
- Guidebook Production and Dissemination.



Structure of Annex 33, Advanced local Energy Planning

Operating Period: *1997 - 2000*
Operating Agent: *Dr. Reinhard Jank , KEA GmbH, Germany*
Participant Countries: *Canada, Germany, Italy, Netherlands, Poland, Sweden, Turkey and the United States of America*

Annex 34: Computer Aided Fault Detection and Diagnosis

Analysis indicates that a 20-30% energy saving in commercial buildings is achievable by re-commissioning of the HVAC systems to rectify faulty operation. Current strategies do not explicitly optimise performance and cannot respond to the occurrence of faults that cause performance to deteriorate. The objective of this Annex is to work with control manufacturers, industrial partners and/or building owners and operators to demonstrate the benefit of computer aided fault detection and diagnostic systems. Methods are based on either stand alone "PC" based systems or incorporated within a future generation of "smart" building control systems.

Subtasks include:

- Constructing a prototype performance validation system for assisting with the final stages of the commissioning or re-commissioning of HVAC systems;
- Constructing prototype performance monitoring systems to detect unsatisfactory performance by comparing current performance with that predicted by a reference model;
- Interfacing prototype systems to building control systems;
- Testing and demonstrating performance validation and monitoring systems in real buildings.

Completion is scheduled for the year 2001.

Operating Period: *1997 - 2001*
Operating Agent (joint): *Dr Arthur Dexter, University of Oxford, UK/ Dr Jouko Pakanen, VTT Building Technology, Finland*
Participating Countries: *Belgium, Canada, Finland, France, Germany, Hong Kong (China) Japan, Netherlands, South Korea (provisional), Sweden, Switzerland, United Kingdom and the United States of America*

5.3 Completed Research

Recently completed projects include:

Annex 28 Low Energy Cooling

The refrigerative cooling of buildings contributes significantly to energy demand, and hence greenhouse gas emissions, of non-domestic buildings. In addition, demand for good thermal comfort is resulting in the wider use of air conditioning. In response to concern over the resultant impact on greenhouse gas emissions, the IEA's Future Building Forum held a workshop on Innovative Cooling in 1993. This identified a number of technologies with the potential to reduce the need for conventional cooling. As a follow-up, Annex 28 (Low Energy Cooling) was established. The primary objectives of this Annex were to identify cooling approaches and to demonstrate their performance. The emphasis was on 'passive' and 'hybrid' cooling strategies. Primary considerations included ensuring that:

- The life cycle costs (including energy and maintenance etc.) were less than conventional systems;
- The level of thermal comfort is comparable with conventional systems;
- The technologies are sufficiently robust to changes in building occupancy and use;

- The design concepts of such systems are well defined and that good guidelines are available for all stages;
- The necessary design tools are available in a form which designers can use in practice;
- The cooling system is shown to integrate with the other systems (e.g. with heating and ventilation) as well as with the building and control strategy.

Subtasks covered:

- Description of Cooling Methods;
- Development of Design Tools;
  - Selection Guidance;- Early Design Guidance; - Detailed Design Tools;
- Case Studies.

Fundamental to this activity was an evaluation by demonstration. The evaluation of case studies presents a unique opportunity to exchange and gain experience from technologies tested under scientific conditions. The aim was to select prestige buildings in which substantial energy savings had been made over conventional technology and in which good thermal comfort was secured.

Working Group - Indicators of Energy Efficiency in Cold Climate Buildings

Working Groups provide a more informal means of undertaking ECBCS research and, in some instances, is used as a pre-study to an Annex. Indicators of Energy Efficiency in Cold Climates is the 6th ECBCS Working Group and has recently been completed. Its task was to provide a means of comparing energy efficiency between buildings, taking into account climatic differences.
Indicators included:

- Energy data for each house;
- Energy source for heating and hot water;
- Floor area;
- Basic Construction type and equipment characteristics;
- Age of building;
- Climate;
- Number of occupants.

Major conclusions were:

- The ranking of houses by different indicators is critically dependent on the treatment of electrical energy (i.e. conversion to primary energy);
- Space heating energy is declining in importance. Indicators need to reflect total energy consumption;
- Homes with similar physical characteristics and equipment are likely to maintain their relative ranking across a broad range of indicators;
- The quality of the indoor environment (temperature, air quality etc.) is not adequately reflected by any of the indicators used in the study.

This project sought to understand the implications of using specific indicators on large, poorly defined groups of houses by examining the impact on a small group of well defined homes. This approach emphasised the building science aspects of the indicators rather than the statistical aspects of large datasets. This approach was not as successful as had been hoped because of the complexity of attempting to develop a standard measure. Nevertheless this project demonstrated some of the fundamental problems with indicators at both practical and physical levels.

Project Period: *1995 - 1999*
WG Chairman: *Alan Meier, Lawrence Berkeley Laboratory, United States of America*
Participating Countries: *Canada, Finland, Germany, Japan, Norway, Poland, Sweden and the United States of America*

These case study buildings are located in various countries representing a very diverse range of climatic conditions from hot and humid to dry and cool (see Table). The various climate conditions give markedly different pre-requisites for the studied technologies. The suitability of a technical alternative is thus often dependent on the location of the building.

		Night Cooling (Natural)	Night Cooling (Mechanical)	Slab Cooling (Water)	Evaporative Cooling	Desiccant Cooling	Chilled Ceiling/Beams	Displacement Ventilation	Ground Cooling (Air)	Aquifer	Ground Cooling (water)	Sea/River/Lake Water Cooling
1	Vila Nova de Gaia, Porto, Portugal	•										
2	The OU Design Studio, Milton Keynes, UK	•										
3	The IONICA Office Building, Cambridge, UK		•									
4	The Dow Building, Horgen, Switzerland			•								
5	Swissair Office Building, Fribourg, Switzerland			•								
6	The ACT2 Stanford Ranch House, Rocklin, California, US			•	•							
7	The One Utah Center Building, Salt Lake City, US				•							
8	Gaz de France Research Centre, Paris, France				•							
9	Infracity Commercial Centre, Stockholm, Sweden					•						
10	The Nestlé-France Head Office, Noisiel, France						•	•				
11	Hamburg Regional Bank, Hamburg, Germany						•	•				
12	The Granlund Office Building, Helsinki, Finland						•					
13	The Wärtsilä Diesel Building, Vaasa, Finland						•					
14	The Schwerzenbacherhof, Zurich, Switzerland		•						•			
15	SAS Frösundavic, Stockholm, Sweden									•		
16	The Groene Hart Hospital, Gouda, Netherlands									•		
17	The Advanced House, Laval, Canada										•	
18	The Purdy's Wharf, Halifax, Canada											•

Location of Annex 28 Case Study Buildings and the Applied Technology

Project Period: *1995 - 1999*
Operating Agent: *Denice Jaunzens, BRE Ltd./ Nick Barnard, Oscar Faber Applied Research, United Kingdom*
Participating Countries: *Finland, France, Germany, Netherlands, Portugal, Sweden, Switzerland, United Kingdom and the United States of America*

6.0 Dissemination

A target of the present operating period has been to broaden the dissemination of ECBCS research and results. To achieve this, ECBCS and its associated Annexes have continued to develop new information and dissemination products. While many reports are disseminated through individual country mechanisms, ECBCS now maintains a central bookstore through which information products are distributed throughout the world. This has had a significant affect on the penetration of Annex information. The range of products include:

Annex Reports

These are the major output of each Annex and provide comprehensive detail about the work. They are usually presented at a high technical level and are aimed at researchers and specialists. A list of recent reports and other publications is presented in the Appendices.

Technical Synthesis Reports

The results of completed Annexes are summarised in the form of Technical Synthesis Reports. These aim to be relatively short (36 - 48 pages) but give a good technical account of the Annex activity, results and conclusions. The target audience includes policy-makers, engineers and those who wish to obtain a general overview of the topic.

Recently published reports cover:

- Building Energy Management Systems;
- Demand Controlled Ventilation Systems;
- Thermal Modelling;
- Fault Diagnosis and Detection;
- Air Flow in Large Enclosures.

CD-ROMS

Increasing use has been made of CD format as an additional choice for reports and data. Among the products available in this format is AIRBASE the AIVC's (Annex 5) Bibliographic Database.

Newsletter

ECBCS produces a twice-yearly newsletter that is distributed free-of-charge to interested organisations. This contains regularly updated information an Annexes and other activities of the ECBCS. Individual Annexes also produce various newsletters and information bulletins.

Other Promotional Material

Promotional material such as Annex brochures, information sheets and displays are produced on a regular basis to provide updated information about specific ECBCS activities. A series of single page brochures aimed at publicising major publications has proved to be very successful in promoting the results of completed activities.

World Wide Web (http://www.ecbcs.org)

The ECBCS web site contains links to all active Annexes as well as other related research. It also contains versions and details of all ECBCS and annex reports, newsletters etc. Accessions average over a thousand each week from users in almost 60 countries. Through the web site it is possible to learn about and to order ECBCS publications.

Slide Show

A 'slide show' has been produced summarising all of the activities of the ECBCS.
This is regularly updated and can be downloaded from the ECBCS Web site.

7. ExCo Support Services Unit (ESSU)

To be formally inaugurated in June 1999, The ExCo Support Services Unit (ESSU) has been established to provide a secretariat and dissemination outlet for ExCo related projects. Its primary functions are:

- Administration of ECBCS activities;
- Programme Support;
- Developing and co-ordinating the dissemination of results;
- Producing technical synthesis reports and other summary information;
- Publishing the ECBCS Newsletter;
- Maintaining the ECBCS Web Site.

ESSU is responsible for maintaining all the ECBCS dissemination activities and draws approximately 10% of its annual operating costs of approximately £86,000 from sales of products.

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10. The Annexes

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Annex 3: Energy Conservation in Residential Buildings (1979-82)*
Annex 4: Glasgow Commercial Building Monitoring (1979-82)*
Annex 5: Air Infiltration and Ventilation Centre (1979-
Annex 6: Energy Systems and Design of Communities (1979-81)*
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Annex 8: Inhabitant Behaviour with Regard to Ventilation (1984-87)*
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Annex 14: Condensation and Energy (1987-90)*
Annex 15: Energy Efficiency in Schools (1988-90)*
Annex 16: Building Energy Management Systems 1:User Interfaces and System Integration (1987-91)*
Annex 17: Building Energy Management Systems 2: Evaluation & Emulation Techniques (1988-92)*
Annex 18: Demand Controlled Ventilation Systems (1987-92)*
Annex 19: Low Slope Roof Systems (1987-93)*
Annex 20: Air Flow Patterns within Buildings (1988-91)*
Annex 21: Calculation of Energy & Environmental Performance of Buildings (1988-93)*
Annex 22: Energy Efficient Communities (1991-93)*
Annex 23: Multizone Air Flow Modelling (1990-94)*
Annex 24: Heat, Air and Moisture Transport (1991-95)*
Annex 25: Real Time Simulation of HVAC-Systems for Building Optimisation, Fault Detection and Diagnosis (1991-95)*
Annex 26: Energy Efficient Ventilation of Large Enclosures (1993-96)*
Annex 27: Evaluation and Demonstration of Domestic Ventilation Systems (1993-1999)
Annex 28: Low Energy Cooling (1993-97)*
Annex 29: Daylighting in Buildings (participating via IA-SHC)
Annex 30: Bringing Simulation to Application
Annex 31: Energy Related Environmental Impacts of Buildings
Annex 32: Integral Building Envelope Performance
Annex 33: Advanced Local Energy Planning
Annex 34: Computer Aided Fault Detection and Diagnosis
Annex 35: Control Strategies for Hybrid Ventilation in New and Retrofitted Office Buildings (Hybvent)
Annex 36: Retrofitting in Educational Buildings - Energy Concept Adviser for Technical Retrofit Measures
Annex 37: Low Exergy Systems for Heating and Cooling of Buildings

The working groups are:
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WG Indicators of Energy Efficiency in Cold Climate Buildings*

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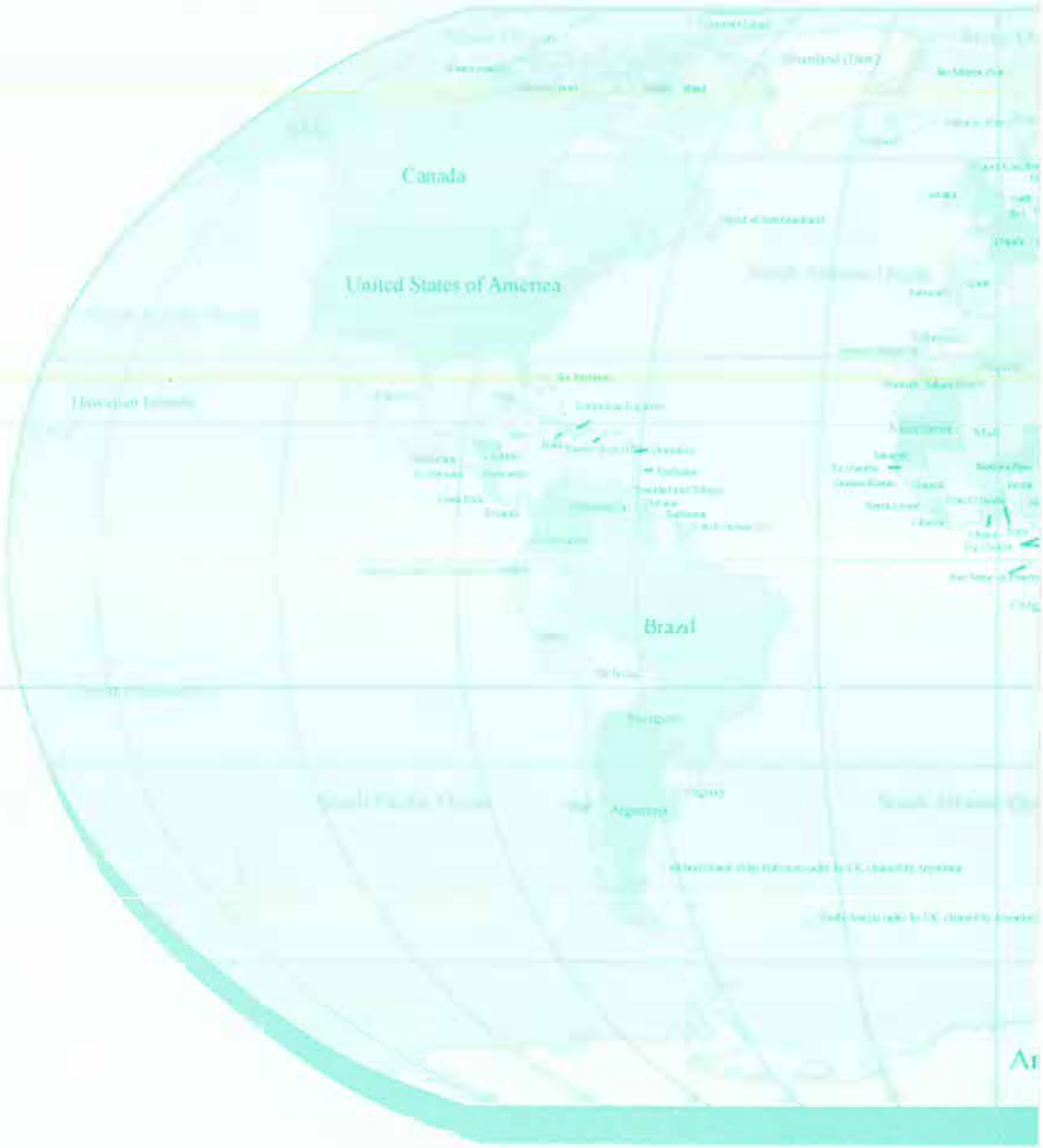

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